

## ABSTRACT

To improve the transmission efficiency of a necessary transmission mode by providing an unnecessary-wave suppression groove that prevents an unnecessary transmission mode from being excited at a mode conversion part between a rectangular waveguide and a circular waveguide.

A rectangular waveguide 2 is connected to a circular waveguide 4 at right angles, and an unnecessary-wave suppression groove 5 that extends along tube walls 2B, 2C, and 2D of the rectangular waveguide 2 and a tube wall 4A of the circular waveguide 4 is provided at a mode conversion part between the rectangular waveguide 2 and the circular waveguide 4. Thus, the unnecessary-wave suppression groove 5 can prevent an unnecessary  $TE_{11}$  mode from being excited in the circular waveguide 4 due to electromagnetic waves of the  $TE_{10}$  mode that transmit through the rectangular waveguide 2, thereby reducing conversion loss due to the  $TE_{11}$  mode. Accordingly, electromagnetic waves of the  $TM_{01}$  mode can be efficiently excited in the circular waveguide 4, and signals can be stably transmitted between the waveguides 2 and 4.